

AP3139

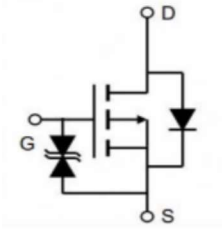
P-Channel Enhancement Mosfet

AIPOWER

DATA SHEET

Feature

- -20V,-0.66A
 $R_{DS(ON)} < 520m\Omega @ V_{GS} = -4.5V$ TYP:430 m Ω
 $R_{DS(ON)} < 700m\Omega @ V_{GS} = -2.5V$ TYP:624 m Ω
 $R_{DS(ON)} < 1200m\Omega @ V_{GS} = -1.8V$ TYP:950 m Ω
- Advanced Trench Technology
- Lead free product is acquired
- ESD Protected Up to 2.0KV(HBM)

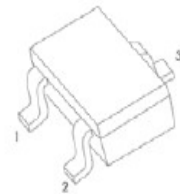


Equivalent Circuit

Application

- Interfacing Switching
- Load Switching
- Logic Level shift

SOT-23



1. GATE
2. SOURCE
3. DRAIN

Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|--------|----------------|-----------|------------|----------------|
| KD | AP3139 | SOT-23 | 7 inch | - | 3000 |

ABSOLUTE MAXIMUM RATINGS ($T_a=25^\circ\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|--|-----------------|-----------|--------------------|
| Drain-Source Voltage | V_{DS} | -20 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | V |
| Continuous Drain Current ($T_C=25^\circ\text{C}$) | I_D | -0.66 | A |
| Continuous Drain Current ($T_C=70^\circ\text{C}$) | I_D | -0.35 | A |
| Pulsed Drain Current | I_{DM} | -1.2 | A |
| Power Dissipation | P_D | 0.15 | W |
| Thermal Resistance from Junction to Ambient ⁽⁴⁾ | $R_{\theta JA}$ | 833 | $^\circ\text{C/W}$ |
| Junction Temperature | T_J | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{STG} | -55~ +150 | $^\circ\text{C}$ |

MOSFET ELECTRICAL CHARACTERISTICS($T_a=25^{\circ}\text{C}$ unless otherwise noted)

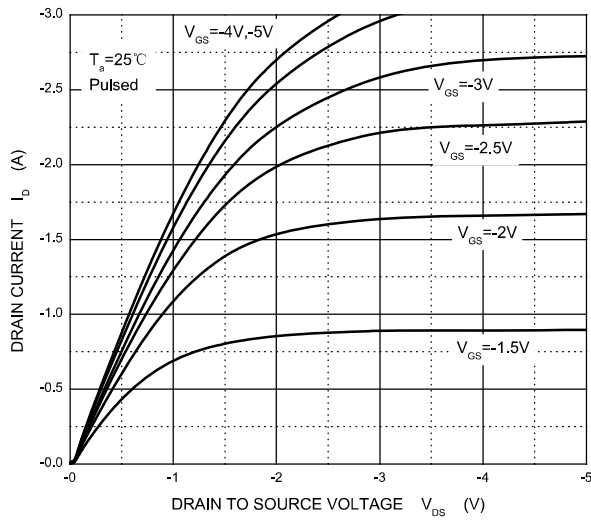
| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---------------|---|-------|-------|----------|------------|
| Static Characteristics | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$ | -20 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = -20V, V_{GS} = 0V$ | - | - | -1 | μA |
| Gate-body leakage current | I_{GSS} | $V_{GS} = \pm 10V, V_{DS} = 0V$ | - | - | ± 20 | μA |
| Gate threshold voltage ⁽³⁾ | $V_{GS(th)}$ | $V_{DS} = V_{GS}, I_D = -250\mu A$ | -0.35 | -0.45 | -1.1 | V |
| Drain-source on-resistance ⁽³⁾ | $R_{DS(on)}$ | $V_{GS} = -4.5V, I_D = -0.65A$ | - | 430 | 520 | m Ω |
| | | $V_{GS} = -2.5V, I_D = -0.55A$ | - | 624 | 700 | |
| | | $V_{GS} = -1.8V, I_D = -0.45A$ | | 950 | 1200 | |
| Dynamic characteristics | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS} = -16V, V_{GS} = 0V, f = 1MHz$ | - | 113 | - | pF |
| Output Capacitance | C_{oss} | | - | 15 | - | |
| Reverse Transfer Capacitance | C_{rss} | | - | 9 | - | |
| Switching characteristics | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD} = -10V, I_D = -0.5A,$ $V_{GS} = -4.5V, R_G = 10\Omega$ | - | 9 | - | ns |
| Turn-on rise time | t_r | | - | 5.8 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 32.7 | - | |
| Turn-off fall time | t_f | | - | 20.3 | - | |
| Total Gate Charge | Q_g | $V_{DS} = -15V, I_D = -1A,$ $V_{GS} = -4.5V$ | - | 1.8 | - | nC |
| Gate-Source Charge | Q_{gs} | | - | 0.31 | - | |
| Gate-Drain Charge | Q_{gd} | | - | 0.3 | - | |
| Source-Drain Diode characteristics | | | | | | |
| Diode Forward voltage ⁽³⁾ | V_{DS} | $V_{GS} = 0V, I_S = -0.5A$ | - | - | -1.2 | V |
| Diode Forward current ⁽⁴⁾ | I_S | | - | - | -0.66 | A |

Notes:

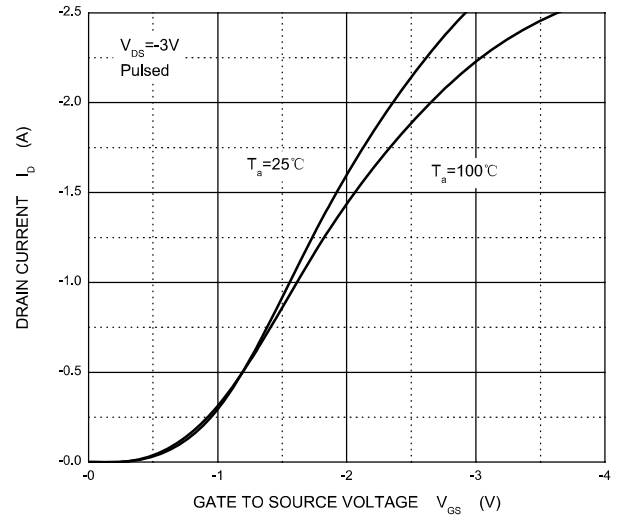
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. Surface Mounted on FR4 Board, $t \leq 10$ sec

Typical Characteristics

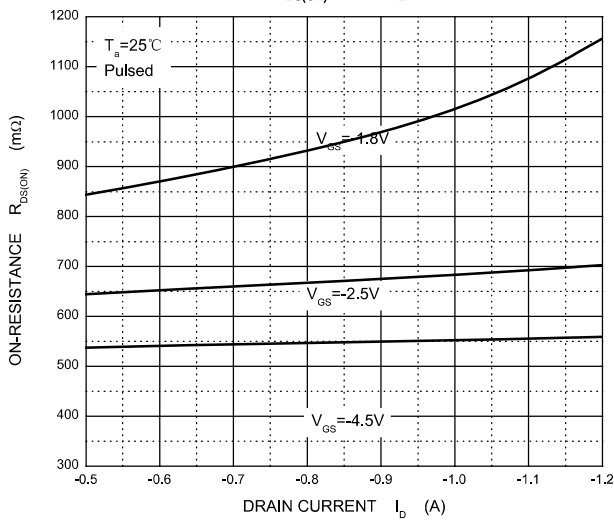
Output Characteristics



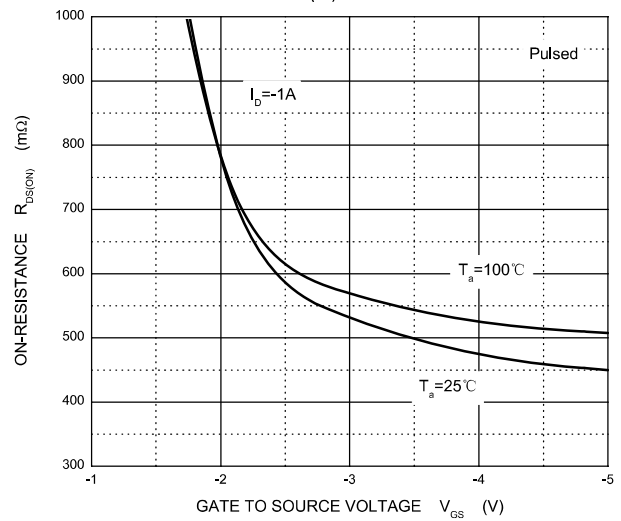
Transfer Characteristics



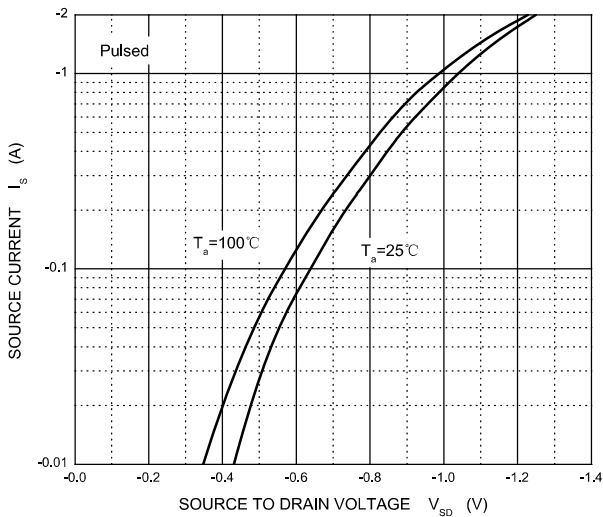
$R_{DS(ON)}$ — I_D



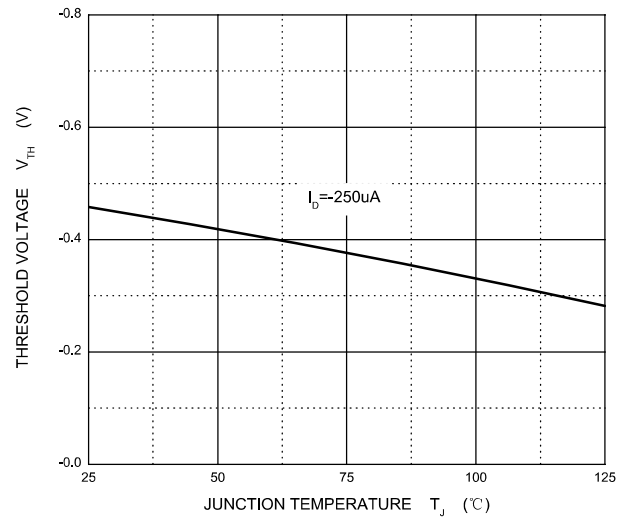
$R_{DS(ON)}$ — V_{GS}



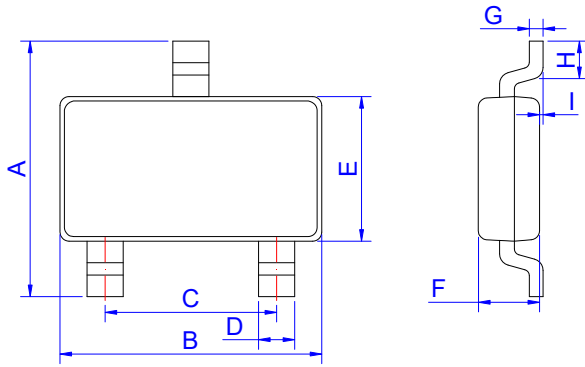
I_S — V_{SD}



Threshold Voltage



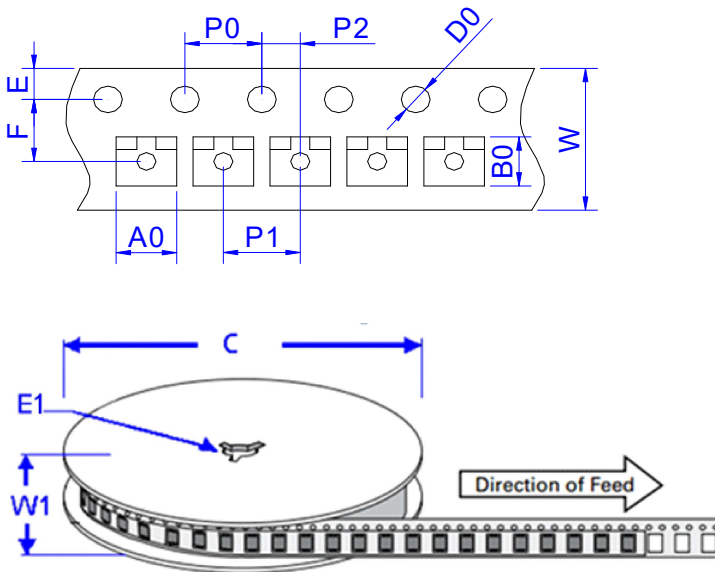
SOT-23 Package Information



SOT-23

| Ref. | Dimensions | | | | | |
|------|-------------|------|------|-----------|-------|-------|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.30 | 2.40 | 2.50 | 0.091 | 0.095 | 0.098 |
| B | 2.80 | 2.90 | 3.00 | 0.110 | 0.114 | 0.118 |
| C | 1.90 REF | | | 0.075 REF | | |
| D | 0.35 | 0.40 | 0.45 | 0.014 | 0.016 | 0.018 |
| E | 1.20 | 1.30 | 1.40 | 0.047 | 0.051 | 0.055 |
| F | 0.90 | 1.00 | 1.10 | 0.035 | 0.039 | 0.043 |
| G | | 0.10 | 0.15 | | 0.004 | 0.006 |
| H | 0.20 | | | 0.008 | | |
| I | 0 | | 0.10 | 0 | | 0.004 |

Package Information-SOT-23



| Ref. | Dimensions | |
|------|-------------|---------------|
| | Millimeters | Inches |
| A0 | 3.15 ± 0.3 | 0.124 ± 0.012 |
| B0 | 2.77 ± 0.3 | 0.109 ± 0.012 |
| C | 178 | 7.0 |
| D0 | 1.50±0.1 | 0.059 ± 0.004 |
| E | 1.75 ± 0.2 | 0.069 ± 0.008 |
| E1 | 13.3±0.3 | 0.524± 0.012 |
| F | 3.5 ± 0.2 | 0.138 ± 0.008 |
| P0 | 4.00 ± 0.2 | 0.157 ± 0.008 |
| P1 | 4.00 ± 0.2 | 0.157 ± 0.008 |
| P2 | 2.00 ± 0.2 | 0.079 ± 0.008 |
| W | 8.00 ± 0.2 | 0.315 ± 0.008 |
| W1 | 11.5±1.0 | 0.453 ± 0.039 |

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